Introduction

The region around the root, the rhizosphere is relatively rich in nutrients and supports large and active microbial populations capable of exerting beneficial, neutral or detrimental effects on plant growth. The importance of microbial populations in the rhizosphere for maintenance of root health, nutrient uptake and tolerance of environmental stress is now recognized (Zaidi *et al*., 2009; Gholami *et al*., 2009; Ahemad and Khan, 2011; Garcia-Gutierrez *et al*., 2012). These beneficial microorganisms can be a significant component of plant disease management practices to achieve attainable yield which also includes the plant growth promoting rhizobacteria (PGPR).

PGPR was first defined by Kloepper and Schroth (1978) to describe the group of soil bacteria that actively colonize the plant roots and enhance plant growth and resistance through direct or indirect mechanisms **(Fig.1**). Significant control of plant pathogens and enhancement of plant development has been demonstrated by PGPR under laboratory and greenhouse conditions (Kouchebagh *et al.*, 2012). The mechanisms by which PGPRs promote plant growth are not fully understood, but are thought to include - the ability to produce phytohormones (Girish *et al*., 2010), asymbiotic nitrogen fixation (Saharan and Nehra, 2011), production of siderophores (Fallahzadeh-Mamaghani *et al*., 2009; Mishra *et al.*, 2010), synthesis of antibiotics, enzymes and/or fungicidal compounds (Zongzheng *et al*., 2009; Islam *et al*., 2012) and solubilization of mineral phosphates and other nutrients (Siddiqui and Akhtar, 2007; Alizadeh *et al*., 2012).

Fluorescent Pseudomonas

The term pseudomonads (*Pseudomonas*-like bacteria) are often used to describe strains for which the taxonomic affiliation has not been established in detail. In recent years, a distinction has been made between *Pseudomonas sensu stricto* and the genera *Burkholderia*, *Ralstonia*, *Acidovorax* and *Comamonas* (all of which were formerly called *Pseudomonas* but belong to the β-subclass). Fluorescent pseudomonads produce the fluorescent pigment Pvd (also known as pseudobactin). This large and heterogeneous group comprises, most notably, *P. aeruginosa*, *P. putida*, *P. fluorescens* and *P. syringae*.

Fluorescent pseudomonads owe their fluorescence to an extracellular diffusible pigment called pyoverdin (Pvd) or pseudobactin. This pigment has high affinity for Fe^{3+} ions (the association constant of the interaction (*K*ass) is ~1024 at pH 7) and is a siderophore (iron-carrier) of the producer strain 46. Ferripyoverdin (that is, Pvd complexed with Fe^{3+}) interacts with a specific outer-membrane receptor, which is present in the producer but might also occur in some non-producers. Subsequently, Fe^{3+} is transported into the cytoplasm and reduced to Fe^{2+}.

Members of the genus *Pseudomonas* (gamma-Proteobacteria subclass, Pseudomonadales order, Pseudomonadaceae family) are motile (one or several polar flagella), non-sporulating rods with gram negative reaction and 58–69% GC content **(Fig. 2).** They are catalase positive and chemo-organotrophic, with a strictly respiratory metabolism (using oxygen and in some cases nitrate as terminal electron acceptor). Within the *Pseudomonas* sensu stricto, which corresponds to the rRNA group I (Palleroni, 2008), the fluorescent pseudomonads include all *Pseudomonas* species with the ability to produce fluorescent pyoverdine siderophores, noticeably *P. aeruginosa, P. syringae, P. putida* and *P. fluorescen*s (Bossis *et al*., 2000).

Fluorescent pseudomonas taxonomic status

The genus *Pseudomonas* belongs to the subclass of the Proteobacteria and includes mostly fluorescent pseudomonads as well as a few non-fluorescent species. fluorescent pseudomonads group represents: 1) phytopathogenic cytochromec oxidase-positive species, such as *P. cichorii*, *P. marginalis* and *P. tolaasii*; 2) non-phytopathogenic, non-necrogenic strains, such as *P. fluorescens, P. putida, P. chlororaphis, P. aureofaciens* and *P. aeruginosa* type species; 3) phytopathogenic necrogenic fluorescent pseudomonads spp without cytochrome c oxidase: *P. syringae* and *P. viridiflava*. Non-fluorescent *Pseudomonas* group constitutes of *P. stutzeri, P. mendocina, P. alcaligenes* and *P. pseudoalcaligenes.* This topic specifically will focus on fluorescent pseudomonads because they are present in many environments, especially in the plant rhizosphere. Many studies involve these bacteria that are able to improve plant growth and plant health and are implicated in the natural supressiveness of certain soils to many soil-borne diseases whereas others participate in the biodegradation of natural and man-made toxic chemical compounds.

Tomato

Tomato (*Solanum lycopersicon*) is most popular vegetable in today's home garden. Tomato belongs to the family *Solanaceae* or the nightshade family and it is a warm season vegetable, intolerant to frost. Tomatoes grow best in summer and in any different soil types, but a deep, loamy, well-drained soil with pH of 6.2 - 6.8 is suitable for tomato cultivation. Several fungi, bacteria and viruses infect tomato plants. Among the bacterial diseases, bacterial spot disease caused by *Xanthomonas vesicatoria*, bacterial canker caused by *Clavibacter michiganensis* spp. *michiganensis* and bacterial wilt caused by *Ralstonia solanacearum* (Smith, 1986) and bacterial speck caused by *P. syringe* are the major seed borne bacterial diseases and have been estimated to cause 30-45% crop losses. Growth habit ranges from strongly determinate (bush type) to indeterminate types bearing fruits of different shapes and sizes.

Tomato is herbaceous sprawling plant growing to 1-3 m in height with weak woody stem. The flowers are yellow in colour and the fruits of cultivated varieties vary in size from cherry tomatoes, about 1–2 cm in size to beefsteak tomatoes, about 10 cm or more in diameter. Most cultivars produce red fruits when ripe. Tomato is a native to Peruvian and Mexican region. Though there are no definite records of when and how it came to India, the Portuguese perhaps introduced it to India. Tomato is one of the most important "protective foods" because of its special nutritive value. It is one of the most versatile vegetable with wide usage in Indian culinary tradition. Tomatoes are used for soup, salad, pickles, ketchup, puree, sauces and in many other ways. It is also used as a salad vegetable. Tomato has very few competitors in the value addition chain of processing.

International scenario

Tomato is the world's largest vegetable crop after potato and sweet potato, but it tops the list of canned vegetables. The total global area under tomato is 46.16 lakh ha and the global production is to the tune of 1279.93 lakh tonnes. Tomato is mainly grown as Rabi crop in the plains of India. However in the hilly region it can also be grown as a summer and rainy season crop.

Uses and Nutritional Value

Tomatoes are consumed fresh in salads and as flavoring ingredients in soups and meat or fish dishes. Various processed forms include pastes, sauces, purees, juices and ketchup. Tomato is one of the most important "protective foods" because of its special nutritive value. It is one of the most versatile vegetable with wide usage in Indian culinary tradition. Tomatos are used for soup, salad, pickles, ketchup, puree, sauces and in many other ways. It is also used as a salad vegetable. Tomato has very few competitors in the value addition chain of processing.